

Board of Education Agenda Item

Item: _____ J. _____

Date: _____ March 23, 2005 _____

Topic: First Review of the Computer/Technology Standards of Learning for Grades K-12

Presenter: Mr. Lan Neugent, Assistant Superintendent for Technology

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Origin:

___ Topic presented for information only (no board action required)

___ Board review required by

___x___ State or federal law or regulation

___ Board of Education regulation

___ Other: _____

___ Action requested at this meeting

___x___ Action requested at future meeting:

Final approval of the Computer/Technology Standards of Learning for Grades K-12.

Previous Review/Action:

___ No previous board review/action

___x___ Previous review/action

date: _____ September 22, 2004 _____

action: _____ The Board of Education accepted the timeline for the review process for the
Computer/Technology Standards of Learning. _____

Background Information:

The Board of Education adopted a schedule for review and revisions to the Standards of Learning at its September 22, 2004 meeting. Accordingly, the Computer/Technology standards are scheduled for review and revision in 2005. (Code of Virginia § 22.1-253.13:1-2 By October 1, 2000, the Board of Education shall establish a regular schedule, in a manner it deems appropriate, for the review, and revision as may be necessary, of the Standards of Learning in all subject areas. Such review of each subject area shall occur at least once every seven years. Nothing in this section shall be construed to prohibit the Board from conducting such review and revision on a more frequent basis.)

Summary of Major Elements

A review of comments on the existing Computer/Technology Standards for Grades K-12 revealed several major areas of concern:

- There is insufficient emphasis on the ethical and responsible use of computers.
- Computer/technology skills should not be taught in isolation; but integrated in all areas of the curriculum.
- Instruction of computer skills should not be limited to specific grade levels or content areas.

- Students need earlier exposure to a variety of technologies and software applications.

In response to input, a set of standards were drafted that address the concerns of educational technology stakeholders as well as reflect a consensus of identification of technology skills and competencies that students in grades K-12 should exhibit. A framework, similar to those developed by other states as well as professional and research organizations, was used to describe the progressive development of skills and competencies in six categories:

- Basic Operations and Concepts
- Social, Ethical, and Human Issues
- Technology Productivity Tools
- Technology Research Tools
- Technology Problem-Solving and Decision-Making Tools
- Technology Communication Tools

Since the introduction of the current Computer/Technology Standards in 1995 and 2000, the use of technology in schools and classrooms has increased and the use of newer, more advanced technologies has become commonplace. The proposed standards are organized into four grade ranges: K-2, 3-5, 6-8, and 9-12. This provides greater opportunity for students to develop, reinforce, and amplify their skills.

Superintendent's Recommendation:

The Superintendent of Public Instruction recommends that the Board of Education approve the proposed Computer/Technology Standards of Learning for Grades K-12 for distribution and for comment at a public hearing to be conducted at its meeting on May 25, 2005.

Impact on Resources:

The Department of Education administers the state standards review process. The agency's existing resources can absorb this responsibility at this time.

Timetable for Further Review/Action:

Following the public hearing the Computer/Technology Standards for Learning for Grades K-12 will be presented for final action by the board at the July 2005 meeting. Upon adoption by the board, the Department of Education will distribute the Computer/Technology Standards for Learning for Grades K-12 to school divisions and implement procedures for providing technical assistance and resources as part of the statewide system of support.

Computer/Technology Standards of Learning Grades K-2

Basic operations and concepts

Students demonstrate their understanding of the nature and operation of technology systems.

C/T K-2.1

- a) Identify the computer as a machine that helps people at school, work, and play.
- b) Demonstrate the ability to perform a variety of tasks; among them turning a computer on and off, starting and closing programs, saving work, creating folders, using pull-down menus, closing windows, dragging objects, and responding to commands.

Students are proficient in the use of technology.

C/T K-2.2

- a) Demonstrate the use of mouse, keyboard, printer, multimedia devices, and earphones.
- b) Use multimedia resources such as interactive books and software with graphical interfaces.

Social, ethical, and human issues

Students practice responsible use of technology systems, information, and software.

C/T K-2.3

- a) Know the school's rules for using computers.
- b) Understand the importance of not sharing personal information or passwords with others.
- c) Understand the basic principles of the ownership of ideas.

Students develop positive attitudes toward technology.

C/T K-2.4

- a) Demonstrate respect for the rights of others while using computers.
- b) Understand the responsible use of equipment and resources.

Technology research tools

Students use technology to locate, evaluate, and collect information from a variety of sources.

C/T K-2.5

- a) Identify information in various formats.
- b) Identify available sources of information.

Problem-solving and decision-making tools

Students use technology resources for solving problems and making informed decisions.

C/T K-2.6

- a) Recognize that technology can be used to solve problems and make informed decisions.
- b) Identify and select technologies to address problems.

Technology communication tools

Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

C/T K-2.7

- a) Identify the best tool to communicate information.
- b) Use technology tools for individual writing, communication, and publishing activities.
- c) Demonstrate the ability to create, save, retrieve, and print documents.

Computer/Technology Standards of Learning Grades 3-5

Basic operations and concepts

Students demonstrate their understanding of the nature and operation of technology systems.

C/T 3-5.1

- a) Discuss common uses of computers in their daily lives and the advantages and disadvantages those uses provide.
- b) Communicate about basic technology components with appropriate terminology.

Students are proficient in the use of technology.

C/T 3-5.2

- a) Use skills and procedures needed to operate various technologies such as scanners, digital cameras, and hand-held computers.
- b) Identify basic software applications such as word processing, databases, and spreadsheets.

Social, ethical, and human issues

Students understand the ethical, cultural, and societal issues related to technology.

C/T 3-5.3

- a) Identify how technology has changed society in areas such as communications, transportation, and the economy.
- b) Discuss ethical behaviors when using information and technology.

Students practice responsible use of technology systems, information, and software.

C/T 3-5.4

- a) Understand the need for the school division's acceptable use policy.
- b) Discuss the rationale of fair use and copyright regulations.
- c) Follow rules for personal safety when using the Internet.

Students develop positive attitudes towards technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

C/T 3-5.5

- a) Work collaboratively when using technology.
- b) Practice and communicate respect for people, equipment, and resources.
- c) Understand how technology expands opportunities for learning.

Technology research tools

Students use technology to locate, evaluate, and collect information from a variety of sources.

C/T 3-5.6

- a) Collect information from a variety of sources.
- b) Evaluate the accuracy of electronic information sources.
- c) Enter data into databases and spreadsheets.

Problem-solving and decision-making tools

Students use technology resources for solving problems and making informed decisions.

C/T 3-5.7

- a) Determine when technology tools are appropriate to solve a problem and make a decision.
- b) Select resources to solve problems and make informed decisions.

Technology communication tools

Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

C/T 3-5.8

- a) Produce documents demonstrating the ability to edit, reformat, and integrate various software tools.
- b) Use technology tools for individual and collaborative writing, communication, and publishing activities.
- c) Use telecommunication tools to communicate and share information with others.

Computer/Technology Standards of Learning Grades 6-8

Basic operations and concepts

Students demonstrate their understanding of the nature and operation of technology systems.

C/T 6-8.1

- a) Describe how technology impacts learning.
- b) Explore how software and hardware are developed to respond to the changing needs of technology.
- c) Describe compatibility issues involving various types of technology.

Students are proficient in the use of technology.

C/T6-8.2

- a) Understand that hardware and software have different operating systems that may affect their use.
- b) Use self-help features such as online tutorials and manuals to learn to use hardware and software.

Social, ethical, and human issues

Students understand the ethical, cultural, and societal issues related to technology.

C/T 6-8.3

- a) Demonstrate knowledge of current changes in information technologies.
- b) Explain the need for laws and policies to govern technology.
- c) Explore career opportunities in technology related careers.

Students practice responsible use of technology systems, information, and software.

C/T 6-8.4

- a) Demonstrate the correct use of fair use and copyright regulations.
- b) Demonstrate compliance with the school division's acceptable use policy and other legal guidelines.

Students develop positive attitudes towards technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

C/T 6-8.5

- a) Work collaboratively and/or independently when using technology.
- b) Practice preventative maintenance of equipment, resources, and facilities.
- c) Explore the potential of the Internet as a means of personal learning and the respectful exchange of ideas and products.

Technology research tools

Students use technology to locate, evaluate, and collect information from a variety of sources.

C/T 6-8.6

- a) Use databases and spreadsheets to evaluate information.
- b) Use technology resources such as calculators and data collection probes for gathering information.
- c) Use Internet and other electronic resources to locate information in real time.

Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

C/T 6-8.7

- a) Use search strategies to retrieve information.
- b) Evaluate the accuracy, relevance, and appropriateness of electronic information sources.

Problem-solving and decision-making tools

Students use technology resources for solving problems and making informed decisions.

C/T 6-8.8

- a) Employ technology in the development of strategies for solving problems.
- b) Use a variety of technologies to identify and provide possible solutions to real-world problems.
- c) Use content-specific tools, software, and simulations such as environmental probes, graphic calculators, exploratory environments, and Web tools.
- d) Participate in collaborative problem-solving activities.
- e) Select and use appropriate tools and technology resources to accomplish a variety of tasks.

Technology communication tools

Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

C/T 6-8.9

- a) Choose the appropriate tool, format, and style to communicate information.
- b) Independently use technology tools to create and communicate for individual and/or collaborative projects.
- c) Produce documents demonstrating the ability to edit, reformat, and integrate various software tools.

Computer/Technology Standards of Learning Grades 9-12

Basic operations and concepts

Students demonstrate their understanding of the nature and operation of technology systems.

C/T 9-12.1

- a) Discuss the inherent advantages and limitations of technology.
- b) Define the relationship between infrastructure, electronic resources, and connectivity.
- c) Identify and describe the impact of new and emerging technologies and their applications.

Students are proficient in the use of technology.

C/T 9-12.2

- a) Identify and resolve hardware and software compatibility issues.
- b) Develop and communicate strategies for solving routine hardware and software problems.

Social, ethical, and human issues

Students understand the ethical, cultural, and societal issues related to technology.

C/T 9-12.3

- a) Assess the potential of information and technology to address personal, lifelong learning, and workplace needs.
- b) Demonstrate knowledge of electronic crimes such as viruses, pirating, and computer hacking.
- c) Explore and participate in online communities and online learning opportunities.
- d) Identify the role that technology will play in future career opportunities.

Students practice responsible use of technology systems, information, and software.

C/T 9-12.4

- a) Adhere to fair use and copyright guidelines.
- b) Adhere to the school division's Acceptable Use Policy as well as other state and federal laws.
- c) Model respect for intellectual property.

Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

C/T 9-12.5

- a) Respectfully collaborate with peers, experts, and others to contribute to an electronic community of learning.
- b) Model responsible use and respect for equipment, resources, and facilities.

Technology research tools

Students use technology to locate, evaluate, and collect information from a variety of sources.

C/T 9-12.6

- a) Integrate databases, spreadsheets, charts, and tables to create reports.
- b) Use available technological tools to expand and enhance understanding of ideas and concepts.

Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

C/T 9-12.7

- a) Analyze and draw conclusions about the comprehensiveness and bias of electronic information

sources.

- b) Design and implement a variety of search strategies to retrieve electronic information.

Problem-solving and decision-making tools

Students use technology resources for solving problems and making informed decisions.

C/T 9-12.8

- a) Investigate and apply expert systems, intelligent agents, and simulations in real-world situations.
- b) Select and apply technology tools for information analysis, problem solving, and decision-making.
- c) Use technology resources such as educational software, simulations, and models for problem-solving, and independent learning.
- d) Produce and disseminate information through collaborative problem-solving activities.

Technology communication tools

Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

C/T 9-12.9

- a) Determine the most effective tool, format, and style to communicate to specific audiences.
- b) Use technology-based options, including distance and distributed education, to collaborate, research, publish, and communicate.
- c) Practice self-directed use of advanced technology tools for communicating with specific audiences.

**Crosswalk Alignment Between the Computer/Technology Standards
Adopted in 1995, 2000 and the 2005 Proposed Standards**

The Crosswalk for the 2005 Computer/Technology Standards of Learning is designed to assist school divisions in the process of aligning and comparing the current Computer/Technology Standards of Learning to the proposed 2005 Computer/Technology Standards of Learning.

The crosswalk provides a standard-by-standard comparison between the existing standards and the proposed standards and provides an explanation for changes, additions, and/or deletions.

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
K-2		
Basic operations and concepts Students demonstrate their understanding of the nature and operation of technology systems. C/T K-2.1 a) Identify the computer as a machine that helps people at school, work, and play.	C/T5.1 The student will demonstrate a basic understanding of computer theory, including bits, bytes, and binary logic.	The proposed Standard of Learning requires students to have knowledge about the concrete uses of technology as opposed to the theoretical aspects that are no longer as important due to the more advanced and user-friendly technology they use in their schools.
Basic operations and concepts Students demonstrate their understanding of the nature and operation of technology systems. C/T K-2.1 b) Demonstrate the ability to perform a variety of tasks; among them, turning a computer on and off, starting and closing programs, saving work, creating folders, using pull-down menus, closing windows, dragging objects, and responding to commands.	C/T 5.2 The student will develop basic technology skills. a) Develop a basic technology vocabulary that includes cursor, software, memory, disk drive, hard drive, and CD-ROM. C/T 5.4 The student will communicate through application software. d) Use local and worldwide network communication systems.	The proposed Standard of Learning requires that students are able to access various resources on the networks, not just application software. They also apply their knowledge of basic vocabulary in order to perform tasks.

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>Basic operations and concepts Students are proficient in the use of technology.</p> <p>C/T K-2.2 a) Demonstrate the use of mouse, keyboard, printer, multimedia devices, and earphones.</p>	<p>C/T 5.2 The student will develop basic technology skills. c) Develop basic keyboarding skills. d) Operate peripheral devices.</p>	<p>The proposed Standard of Learning recognizes that computer input goes beyond basic keyboarding to include many peripherals now commonly available in schools.</p>
<p>Basic operations and concepts Students are proficient in the use of technology.</p> <p>C/T K-2.2 b) Use multimedia resources such as interactive books and software with graphical interfaces.</p>	<p>C/T 5.2 The student will develop basic technology skills. b) Select and use technology appropriate to tasks.</p>	<p>Students have much more sophisticated software today than in the past. The proposed Standard of Learning reflects the new options with which students will need to be familiar.</p>
<p>Social, ethical, and human issues Students practice responsible use of technology systems, information, and software.</p> <p>C/T K-2.3 a) Know the school's rules for using computers. b) Understand the importance of not sharing personal information or passwords with others. c) Understand the basic principles of the ownership of ideas.</p> <p>Social, ethical, and human issues Students develop positive attitudes toward technology.</p> <p>C/T K-2.4</p>		<p>In the current Standards of Learning, these social, ethical, and human issues are not addressed until the 12th grade C/T Standards of Learning. However, in today's world, even the youngest children need to be aware of the rules for using the Internet and software, as well as the need for ethical behavior when dealing with technology. These two proposed Standards of Learning address such issues.</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
a) Demonstrate respect for the rights of others while using computers. b) Understand the responsible use of equipment and resources.		
Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources. C/T K-2.5 a) Identify information in various formats. b) Identify available sources of information.	C/T5.3 The student will process, store, retrieve, and transmit electronic information. a) Use search strategies to retrieve electronic information using databases, CD-ROMs, videodiscs, and telecommunications. b) Use electronic encyclopedias, almanacs, indexes, and catalogs. c) Use local and wide-area networks and modem-delivered services to access information from electronic databases.	The current Standard of Learning do not separate skills needed in K-2 from those in 3-5. This proposed Standard of Learning addresses the level of research skills that can be expected of the youngest students. It also avoids providing a list of potential sources of information as this technology changes quickly.
Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions. C/T K-2.6 a) Recognize that technology can be used to solve problems and make informed decisions. b) Identify and select technologies to address problems.	C/T 5.2 The student will develop basic technology skills. b) Select and use technology appropriate to tasks. e) Apply technologies to strategies for problem solving and critical thinking.	The use of technology as a problem-solving tool is a new emphasis for the proposed C/T Standards of Learning, although the current Standards of Learning briefly address problem solving. One of the strengths of technology is its capability to extend the students' own abilities in this area. At this stage, students will begin to perceive that they can use technology to help them in their various problem-solving tasks.
Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. C/T K-2.7 a) Identify the best tool to communicate information.		Currently, students have access to an increasing array of options for communicating with others and they need to be able to harness this power through the ability to make choices about which method is most effective in various circumstances.
Technology communication tools	C/T 5.4 The student will communicate through	The variety of projects that young students

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.</p> <p>C/T K-2.7</p> <p>b) Use technology tools for individual writing, communication, and publishing activities.</p>	<p>application software.</p> <p>a) Create a one or two page document using word processing skills, writing process steps, and publishing programs.</p> <p>b) Use simple computer graphics and integrate graphics into word-processed documents.</p> <p>c) Create simple databases and spreadsheets to manage information and create reports.</p>	<p>may implement with the help of technology is too broad to list and limit, so the proposed Standard of Learning avoids doing that, focusing on the purposes of such software rather than specific tasks.</p>
<p>Technology communication tools</p> <p>Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.</p> <p>C/T K-2.7</p> <p>c) Demonstrate proficiency in the ability to create, save, retrieve, and print documents.</p>	<p>C/T 5.4 The student will communicate through application software.</p> <p>a) Create a one or two page document using word processing skills, writing process steps, and publishing programs.</p> <p>b) Use simple computer graphics and integrate graphics into word-processed documents.</p> <p>c) Create simple databases and spreadsheets to manage information and create reports.</p>	<p>The current Standard of Learning limit students' skills by providing a list of particular tasks. The proposed Standard of Learning focus on broader skills that are used with a wide variety of software.</p>
<p>3-5</p>		
<p>Basic operations and concepts</p> <p>Students demonstrate their understanding of the nature and operation of technology systems.</p> <p>C/T 3-5.1</p> <p>a) Discuss common uses of computers in their daily lives and the advantages and disadvantages those uses provide.</p> <p>b) Communicate about basic technology components with appropriate terminology.</p>	<p>C/T 5.2 The student will develop basic technology skills.</p> <p>a) Develop a basic technology vocabulary that includes cursor, software, memory, disk drive, hard drive, and CD-ROM.</p>	<p>This proposed Standard of Learning reflects the fact that students have many different experiences with technology inside and outside the classroom, and need to be able to communicate their abilities and knowledge to others. The proposed Standard of Learning requires the student to apply their knowledge in practical ways.</p>
<p>Basic operations and concepts</p> <p>Students are proficient in the use of technology.</p>	<p>C/T 5.2 The student will develop basic technology skills.</p> <p>d) Operate peripheral devices.</p>	<p>The proposed Standard of Learning is re-written to be consistent with the other proposed Standards of Learning, and to note the types of peripherals students may find in</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
C/T 3-5.2 a) Use skills and procedures needed to operate various technologies such as scanners, digital cameras, and hand-held computers.		their classrooms today, as opposed to the more simple peripherals they have been exposed to in the past.
Basic operations and concepts Students are proficient in the use of technology. C/T 3-5.2 b) Identify basic software applications such as word processing, databases, and spreadsheets.		This proposed Standard of Learning is based on the need for students to differentiate between different types of tool software and their purposes. Beyond knowing how to use the software under direction from a teacher, students need to be able to discern the strengths and weaknesses of each tool for their purposes.
Social, ethical, and human issues Students understand the ethical, cultural, and societal issues related to technology. C/T 3-5.3 a) Identify how technology has changed society in areas such as communications, transportation, and the economy.		Students are much more aware of how technology impacts their culture today and they need a chance to be able to make sense of this information. This is prerequisite knowledge for understanding and complying with rules and regulations regarding technology.
Social, ethical, and human issues Students understand the ethical, cultural, and societal issues related to technology. C/T 3-5.3 b) Discuss ethical behaviors when using information and technology.		This issue is not addressed until the 12th grade Standards of Learning in the current C/T Standards of Learning. However, as students become more sophisticated users of technology, they must also learn how to use the technology responsibly and ethically.
Social, ethical, and human issues Students practice responsible use of technology systems, information, and software. C/T 3-5.4		All school divisions are required to have an Acceptable Use Policy. Students should be familiar with the policy from an early age.

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
a) Understand the need for the school division's Acceptable Use Policy.		
Social, ethical, and human issues Students practice responsible use of technology systems, information, and software. C/T 3-5.4 b) Discuss the rationale of fair use and copyright regulations.		As students use technology more and more for research, problem solving and communication, they need to be aware of the accepted guidelines for copyright and fair use and understand why such guidelines are necessary.
Social, ethical, and human issues Students practice responsible use of technology systems, information, and software. C/T 3-5.4 c) Follow rules for personal safety when using the Internet.		Students have increasing access to the Internet and must have a sense of the dangers involved in order to be protected. The proposed Standard of Learning focuses on student responsibility.
Social, ethical, and human issues Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity. C/T 3-5.5 a) Work collaboratively when using technology. b) Practice and communicate respect for people, equipment, and resources.		In order to be effective users of technology, students need to have positive experiences. They must develop an ethical system for working with others when using technology and for working with the technology itself. This proposed Standard of Learning addresses the need for students to learn these skills while using technology.

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>Social, ethical, and human issues Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.</p> <p>C/T 3-5.5 c) Understand how technology expands opportunities for learning.</p>		<p>Students at this age should learn how technology can increase their own capacity for learning. The proposed Standard of Learning tackles the new availability of technology to expand learning opportunities for students and also their own ability to reflect on their learning process.</p>
<p>Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources.</p> <p>C/T 3-5.6 a) Collect information from a variety of sources.</p>	<p>C/T 5.3 The student will process, store, retrieve, and transmit electronic information. a) Use search strategies to retrieve electronic information using databases, CD-ROMs, videodiscs, and telecommunications. b) Use electronic encyclopedias, almanacs, indexes, and catalogs. c) Use local and wide-area networks and modem-delivered services to access information from electronic databases.</p>	<p>The proposed Standard of Learning is more succinct than the current Standard of Learning. It reflects the wide variety of sources available to students, now and in the future.</p>
<p>Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources.</p> <p>C/T 3-5.6 b) Evaluate the accuracy of electronic information sources.</p>		<p>In the current Standards of Learning, students are not asked to do this until the 12th grade Standards of Learning. However, as students increasingly use more and more research from electronic sources, they need to be aware that not all information sources are accurate.</p>
<p>Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources.</p> <p>C/T 3-5.6</p>	<p>C/T 5.4 The student will communicate through application software. c) Create simple databases and spreadsheets to manage information and create reports.</p>	<p>Although students may create databases and spreadsheets under C/T Standard of Learning 3-5.8, they also must learn how to use databases and spreadsheets that have already been developed in order to manage new information and create understanding out of</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
c) Enter data into databases and spreadsheets.		data.
Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions. C/T 3-5.7 a) Determine when technology tools are appropriate to solve a problem and make a decision. b) Select resources to solve problems and make informed decisions.	C/T 5.2 The student will develop basic technology skills. b) Select and use technology appropriate to tasks. e) Apply technologies to strategies for problem solving and critical thinking.	The proposed Standard of Learning is consistent with the other proposed Standards of Learning.
Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. C/T 3-5.8 a) Produce documents demonstrating the ability to edit, reformat, and integrate various software tools.	C/T 5.4 The student will communicate through application software. a) Create a one or two page document using word processing skills, writing process steps, and publishing programs. b) Use simple computer graphics and integrate graphics into word-processed documents. c) Create simple databases and spreadsheets to manage information and create reports.	With the access to a wide variety of software applications, students have the ability to go beyond doing simple projects. They also must learn how to integrate the various software applications in order to use these tools most effectively.
Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. C/T 3-5.8 b) With assistance from the teacher, use technology tools for individual and collaborative writing, communication, and publishing activities.	C/T 5.4 The student will communicate through application software. a) Create a one or two page document using word processing skills, writing process steps, and publishing programs. b) Use simple computer graphics and integrate graphics into word-processed documents. d) Use local and worldwide network communication systems.	The proposed Standard of Learning places emphasis on the process students must use in their learning activities, as much as the end product.
Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively	C/T 5.4 The student will communicate through application software. d) Use local and worldwide network	The proposed Standard of Learning restates the current Standard of Learning to focus on the purpose for using the technology, and

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>to multiple audiences.</p> <p>C/T 3-5.8 c) Use telecommunication tools to communicate and share information with others.</p>	<p>communication systems.</p> <p>C/T5.3 The student will process, store, retrieve, and transmit electronic information. d) Describe advantages and disadvantages of various computer processing, storage, retrieval, and transmission techniques.</p>	<p>requires students to apply the knowledge they have about communication tools.</p>
<p>6-8</p>		
<p>Basic operations and concepts Students demonstrate their understanding of the nature and operation of technology systems.</p> <p>C/T 6-8.1 a) Describe how technology impacts learning. b) Explore how software and hardware are developed to respond to the changing needs of technology. c) Describe compatibility issues involving various types of technology.</p>	<p>C/T8.3 The student will have a basic understanding of computer processing, storing, retrieval, and transmission technologies and a practical appreciation of the relevant advantages and disadvantages of various processing, storage, retrieval, and transmission technologies.</p>	<p>This new Standard of Learning requires students to reflect on issues that they are aware of in general terms. They need to be able to make sense of technology and its role in their lives in order to be able to apply technology to increase their learning abilities. The closest current Standard of Learning focuses mainly on theoretical understandings of a specific sub-set of technology compatibility issues.</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>Basic operations and concepts Students are proficient in the use of technology.</p> <p>C/T 6-8.2 a) Understand that hardware and software have different operating systems that may affect their use. b) Use self-help features such as online tutorials and manuals to learn to use hardware and software.</p> <p>Social, ethical, and human issues Students understand the ethical, cultural, and societal issues related to technology.</p> <p>C/T 6-8.3 a) Demonstrate knowledge of current changes in information technologies.</p>		<p>These proposed Standards of Learning address the need for students to learn about new technologies and how they might be used with existing technologies. Such knowledge helps students take greatest advantage of both old and new technologies.</p>
<p>Social, ethical, and human issues Students understand the ethical, cultural, and societal issues related to technology.</p> <p>C/T 6-8.3 b) Explain the need for laws and policies to govern technology.</p>		<p>Students need to be more aware of the laws concerning technology use today than ever before. In the current Standards of Learning, these issues are not addressed until 12th grade.</p>
<p>Social, ethical, and human issues Students understand the ethical, cultural, and societal issues related to technology.</p> <p>C/T 6-8.3 c) Explore career opportunities in technology related careers.</p>		<p>As many students may be interested in technology-related careers, the middle grades are a great time to explore these options and relate them to the current technologies the students are using in their learning experiences.</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
Social, ethical, and human issues Students practice responsible use of technology systems, information, and software. C/T 6-8.4 a) Demonstrate the correct use of fair use and copyright regulations.		In the current Standards of Learning, these issues are not addressed until the 12th grade C/T Standards of Learning. However, in today's world, middle grade students should understand the principals of fair use and the proper application of copyright law. They will be using technology much more than any previous generation to create their own works.
Social, ethical, and human issues Students practice responsible use of technology systems, information, and software. C/T 6-8.4 b) Demonstrate compliance with the school division's Acceptable Use Policy and other legal guidelines.		All school divisions are required to have an Acceptable Use Policy. Students should be familiar with the policy, as well as the federal and state laws that deal with technology use and abuse.
Social, ethical, and human issues Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity. C/T 6-8.5 a) Work collaboratively and/or independently when using technology. c) Explore the potential of the Internet as a means of personal learning and the respectful exchange of ideas and products.		This proposed Standard of Learning recognizes that the effective use of technology requires the ability not only to work well independently but also to work with others. Additionally, students may work with students who are not in their own school as they begin to pursue their own interests.
Social, ethical, and human issues Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and		Students at this age need to show a degree of responsibility in their use of a school's communal technology. Not only should they have a sense of how to fix minor problems,

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>productivity.</p> <p>C/T 6-8.5 b) Practice preventative maintenance of equipment, resources, and facilities.</p>		<p>they should be proactive in preventing any problems that can be avoided.</p>
<p>Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources.</p> <p>C/T 6-8.6 a) Use databases and spreadsheets to evaluate information.</p>	<p>C/T 8.1 The student will communicate through application software. b) Communicate spreadsheets by entering data and setting up formulas, analyzing data, and creating graphs or charts to visually represent data. c) Communicate with databases by defining fields and entering data, sorting, and producing reports in various forms.</p>	<p>Students will create databases and spreadsheets in the classroom (C/T 6-8.9), but the ability to analyze the information provided by such tools, whether of their own creation or not, is the key skill.</p>
<p>Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources.</p> <p>C/T 6-8.6 b) Use technology resources such as calculators and data collection probes for gathering information.</p>		<p>These technologies have become widely available in schools and students must learn how to use them properly and effectively. The proposed Standard of Learning is based on a more available technology.</p>
<p>Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources.</p> <p>C/T 6-8.6 c) Use the Internet and other electronic resources to locate information in real time.</p>	<p>C/T 8.4 The student will process, store, retrieve, and transmit electronic information. a) Use search strategies to retrieve electronic information. b) Use electronic encyclopedias, almanacs, indexes, and catalogs to retrieve and select relevant information. c) Use laserdiscs with a computer in interactive mode. d) Use local and wide-area networks and</p>	<p>The proposed Standard of Learning represents the broader spectrum of information resources available than in the past and avoids providing a list, which will be outdated as emerging technologies become available in the schools.</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
	modem-delivered services to access and retrieve information from electronic databases. e) Use databases to perform research.	
Technology research tools Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks. C/T 6-8.7 a) Use search strategies to retrieve information.	C/T 8.4 The student will process, store, retrieve, and transmit electronic information. a) Use search strategies to retrieve electronic information.	The proposed Standard of Learning reflects a skill that is still necessary.
Technology research tools Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks. C/T 6-8.7 b) Evaluate the accuracy, relevance, and appropriateness of electronic information sources.		This Standard of Learning is not addressed until the 12th grade in the current C/T Standards of Learning. However, as students use more and more electronic sources in their research, they need to develop their skills in determining the accuracy, relevance, and appropriateness of this information.
Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions. C/T 6-8.8 a) Employ technology in the development of strategies for solving problems. b) Use a variety of technologies to identify and provide possible solutions to real-world problems.		Although using technology to solve problems is implied in the current Standards of Learning, it is explicitly stated in the proposed Standards of Learning. One of the most effective uses of technology is to use it to extend the problem-solving capabilities of the student. The extension of such techniques to solving real-world problems is a reflection of the skills students need to have by the time they leave school.
Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions.		The wider availability of such tools has made this proposed Standard of Learning possible. The skills students may gain from the use of

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C/T 6-8.8 c) Use content-specific tools, software, and simulations such as environmental probes, graphic calculators, exploratory environments, and web tools.		these technologies are skills that can be used later in life and transferred to workplace skills.
Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions. C/T 6-8.8 d) Participate in collaborative problem-solving activities.		The technology widely available to students today allows them to work not only with classmates and schoolmates, but also with the wider world. This Standard of Learning addresses this new reality.
Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions. C/T 6-8.8 e) Select and use appropriate tools and technology resources to accomplish a variety of tasks. Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. C/T 6-8.9 a) Choose the appropriate tool, format, and style to communicate information.		Students must learn how to choose the best tools for a particular job as they become older, rather than relying on the teacher to point the way. These proposed Standards of Learning address the development of this ability while using technology.
Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively	C/T 8.1 The student will communicate through application software. a) Compose and edit a multipage document at	The proposed Standard of Learning places emphasis on the process students must use in their learning activities as much as the end

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>to multiple audiences.</p> <p>C/T 6-8.9 b) Independently use technology tools to create and communicate for individual and/or collaborative projects.</p>	<p>the keyboard, using word-processing skills and the writing process steps.</p> <p>b) Communicate spreadsheets by entering data and setting up formulas, analyzing data, and creating graphs or charts to visually represent data.</p> <p>c) Communicate with databases by defining fields and entering data, sorting, and producing reports in various forms.</p> <p>d) Use advanced publishing software, graphics programs, and scanners to produce page layouts.</p> <p>e) Integrate databases, graphics, and spreadsheets into word-processed documents.</p> <p>C/T8.2 The student will communicate through networks and telecommunication.</p> <p>a) Use local and worldwide network communication systems.</p> <p>b) Develop hypermedia home page documents that can be accessed by worldwide networks.</p>	<p>product. Students may use any sort of technology for such communication, from video to simple word processing. This avoids providing a list of particular tasks students need to perform.</p>
<p>Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.</p> <p>C/T 6-8.9 c) Produce documents demonstrating the ability to edit, reformat, and integrate various software tools.</p>	<p>C/T 8.1 The student will communicate through application software.</p> <p>a) Compose and edit a multipage document at the keyboard, using word processing skills and the writing process steps.</p> <p>b) Communicate spreadsheets by entering data and setting up formulas, analyzing data, and creating graphs or charts to visually represent data.</p> <p>c) Communicate with databases by defining fields and entering data, sorting, and producing reports in various forms.</p>	<p>The variety of software available for students to use to communicate their knowledge is now too difficult to catalog. The proposed Standard of Learning broadens the scope of potential technology projects and focuses on the common skills needed to manipulate any type of software.</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
	<p>d) Use advanced publishing software, graphics programs, and scanners to produce page layouts.</p> <p>e) Integrate databases, graphics, and spreadsheets into word-processed documents.</p>	
9-12		
<p>Basic operations and concepts Students demonstrate their understanding of the nature and operation of technology systems.</p> <p>C/T 9-12.1 a) Discuss the inherent advantages and limitations of technology.</p>	<p>C/T 12.1 The student will demonstrate a basic understanding of fundamental computer operations and concepts.</p> <p>c) Use terminology related to computers and technology appropriately in written and oral communications.</p>	<p>The proposed Standard of Learning requires students to reflect on issues that they are aware of in general terms. They need to be able to make sense of technology and its role in their lives in order to be able to apply technology to increase their learning abilities. This takes these older students towards a more in-depth understanding of technology than the current Standard of Learning.</p>
<p>Basic operations and concepts Students demonstrate their understanding of the nature and operation of technology systems.</p> <p>C/T 9-12.1 b) Define the relationship between infrastructure, electronic resources, and connectivity.</p>	<p>C/T 12.1 The student will demonstrate a basic understanding of fundamental computer operations and concepts.</p> <p>e) Describe how computers may be connected to form a telecommunication network.</p> <p>C/T 12.3 The student will develop skills in the use of telecommunications networks.</p> <p>b) Compare and contrast the use of local area networks, wide area networks and worldwide networks.</p> <p>d) Demonstrate an understanding of the concepts of broadcast instruction, audio/video conferencing, and other distance learning applications.</p>	<p>The proposed Standard of Learning is based on the recognition that new forms of technology will arise and that students will need to understand the basic relationships between these types of technologies and their resources. It avoids providing a list of particular resources.</p>
<p>Basic operations and concepts Students demonstrate their understanding of the nature and operation of technology</p>	<p>C/T 12.1 The student will demonstrate a basic understanding of fundamental computer operations and concepts.</p>	<p>The proposed Standard of Learning requires students to reach beyond a surface understanding of new and emerging</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>systems.</p> <p>C/T 9-12.1 c) Identify and describe the impact of new and emerging technologies and their applications.</p>	<p>g) Identify new and emerging technologies.</p>	<p>technologies and to evaluate these technologies in terms of their impact on their own lives.</p>
<p>Basic operations and concepts Students are proficient in the use of technology.</p> <p>C/T 9-12.2 a) Identify and resolve hardware and software compatibility issues. b) Develop and communicate strategies for solving routine hardware and software problems.</p>	<p>C/T 12.1 The student will demonstrate a basic understanding of fundamental computer operations and concepts. a) Successfully operate a multimedia computer system with related peripheral devices. b) Demonstrate touch typing skills in computer use. f) Analyze and solve simple hardware and software problems</p>	<p>The proposed Standard of Learning requires students to learn the skills needed for ongoing use of technology, even those not yet invented. The skills they learn for de-coding directions and technical information, as well as troubleshooting hardware and software will serve them throughout their learning career. The current Standard of Learning is applied to earlier grades under the proposed Standards of Learning.</p>
<p>Social, ethical, and human issues Students understand the ethical, cultural, and societal issues related to technology.</p> <p>C/T 9-12.3 a) Assess the potential of information and technology to address personal, lifelong learning, and workplace needs. c) Explore and participate in online communities and online learning opportunities. d) Identify the role that technology will play in future career opportunities.</p>	<p>C/T 12.1 The student will demonstrate a basic understanding of fundamental computer operations and concepts. g) Identify new and emerging technologies.</p> <p>C/T 12.3 The student will develop skills in the use of telecommunications networks. d) Demonstrate an understanding of the concepts of broadcast instruction, audio/video conferencing, and other distance learning applications.</p>	<p>The proposed Standard of Learning provides for supplying students with the background, knowledge, skill, and experience to continue their learning career beyond their school years. They learn how to evaluate and apply actively what they know rather than be passive observers.</p>
<p>Social, ethical, and human issues Students understand the ethical, cultural, and societal issues related to technology.</p>		<p>The proposed Standard of Learning reflects new technology and issues that were not applicable in the past.</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
C/T 9-12.3 b) Demonstrate knowledge of electronic crimes such as viruses, pirating, and computer hacking.		
Social, ethical, and human issues Students practice responsible use of technology systems, information, and software. C/T 9-12.4 a) Adhere to fair use and copyright guidelines. b) Adhere to the school division's Acceptable Use Policy as well as other state and federal laws. c) Model respect for intellectual property.	C/T 12.3 The student will develop skills in the use of telecommunications networks. e) Explain legal, personal safety, network etiquette, and ethical behaviors regarding the use of technology and information. C/T 12.4 The student will demonstrate skill in the selection and use of appropriate technologies to gather, process and analyze data and to report information related to an investigation. f) Appropriately cite electronic resources in gathering information. g) Apply Copyright and Fair Use Guidelines in reporting information.	The proposed Standard of Learning requires students to not only follow fair use guidelines, but also the division's Acceptable Use Policy and copyright law. It also asks them to apply their knowledge as they become models for other students.
Social, ethical, and human issues Students develop positive attitudes toward technology. C/T 9-12.5 a) Respectfully collaborate with peers, experts, and others to contribute to an electronic community of learning.	C/T 12.4 The student will demonstrate skill in the selection and use of appropriate technologies to gather, process, and analyze data and to report information related to an investigation. e) Utilize a variety of media and resources in collaboration with peers, experts, and others to design a learning activity and/or presentation.	The proposed Standard of Learning places an emphasis on process as much as on product.
Social, ethical, and human issues Students develop positive attitudes toward technology. C/T 9-12.5 b) Model responsible use and respect for		This proposed Standard of Learning recognizes that students must learn to act responsibly with communal technology resources and that older students especially should model proper behavior.

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
equipment, resources, and facilities.		
Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources. C/T 9-12.6 a) Integrate databases, spreadsheets, charts, and tables to create reports.	C/T 12.2 The student will use application software to accomplish a variety of learning tasks. d) Use features of applications that integrate word processing, database, spreadsheet, telecommunication, and graphics.	The proposed Standard of Learning is restated to be more consistent with other proposed Standards of Learning.
Technology research tools Students use technology to locate, evaluate, and collect information from a variety of sources. C/T 9-12.6 b) Use available technological tools to expand and enhance understanding of ideas and concepts.	C/T 12.2 The student will use application software to accomplish a variety of learning tasks. g) Apply specific-purpose electronic devices (such as, a graphing calculator, scientific probeware, or multi-function keyboards) in appropriate content areas). C/T 12.4 The student will demonstrate skill in the selection and use of appropriate technologies to gather, process, and analyze data and to report information related to an investigation. c) Evaluate the usefulness, appropriateness, currency, and reliability of acquired information.	The proposed Standard of Learning requires students to analyze information for the purpose of generating understanding for themselves and others.
Technology research tools Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks. C/T 9-12.7 a) Analyze and draw conclusions about the comprehensiveness and bias of electronic	C/T 12.4 The student will demonstrate skill in the selection and use of appropriate technologies to gather, process, and analyze data and to report information related to an investigation. a) Design and use a wide range of effective search strategies to acquire information. b) Use a wide variety of electronic media and	The proposed Standard of Learning is restated to be more consistent with other proposed Standards of Learning.

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
<p>information sources.</p> <p>b) Design and implement a variety of search strategies to retrieve electronic information.</p>	<p>databases to search for and retrieve information.</p> <p>c) Evaluate the usefulness, appropriateness, currency, and reliability of acquired information.</p>	
<p>Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions.</p> <p>C/T 9-12.8 a) Investigate and apply expert systems, intelligent agents, and simulations in real-world situations.</p>		<p>The proposed Standard of Learning reflects the wider availability of such technology tools for these purposes.</p>
<p>Problem-solving and decision making tools Students use technology resources for solving problems and making informed decisions.</p> <p>C/T 9-12.8 b) Select and apply technology tools for information analysis, problem solving, and decision making. c) Use technology resources such as educational software, simulations, and models for problem solving, and independent learning. d) Produce and disseminate information through collaborative problem solving activities.</p>	<p>C/T 12.2 The student will use application software to accomplish a variety of learning tasks. f) Select, evaluate, and use appropriate technology for research and data collection.</p> <p>C/T 12.4 The student will demonstrate skill in the selection and use of appropriate technologies to gather, process, and analyze data and to report information related to an investigation. e) Utilize a variety of media and resources in collaboration with peers, experts, and others to design a learning activity and/or presentation.</p>	<p>The use of technology as a problem-solving tool is a new emphasis for the proposed C/T Standard of Learning, although the current Standard of Learning briefly address problem solving. One of the strengths of technology is its capability to extend the students' own abilities in this area. They need many opportunities to practice and refine this skill set.</p>
<p>Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.</p>	<p>C/T 12.4 The student will demonstrate skill in the selection and use of appropriate technologies to gather, process and analyze data and to report information related to an investigation.</p>	<p>The proposed Standard of Learning is restated to be more consistent with other proposed Standard of Learning.</p>

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
C/T 9-12.9 a) Determine the most effective tool, format, and style to communicate to specific audiences.	d) Select appropriate technology for communicating information for an intended purpose and audience.	
Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. C/T 9-12.9 b) Use technology-based options, including distance and distributed education, to collaborate, research, publish, and communicate.	C/T 12.3 The student will develop skills in the use of telecommunications networks. a) Use local, wide area, and worldwide network communication systems to access, analyze, interpret, and synthesize information. c) Access and use telecommunications tools and resources for information sharing, remote information access and retrieval, and multi-media/hypermedia publishing. d) Demonstrate an understanding of the concepts of broadcast instruction, audio/video conferencing, and other distance learning applications.	The proposed Standard of Learning reflects new technology, and makes allowance for technologies that may not yet have reached into the classroom. It also focuses on the uses of the technology.
Technology communication tools Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences. C/T 9-12.9 c) Practice self-directed use of advanced technology tools for communicating with specific audiences.	C/T 12.2 The student will use application software to accomplish a variety of learning tasks. a) Use advanced features of word processing, desktop publishing, graphics programs, and utilities in learning activities. b) Use spreadsheets for analyzing, organizing, and displaying numeric data graphically. c) Design and manipulate databases and generate customized reports. d) Use features of applications that integrate word processing, database, spreadsheet, telecommunication, and graphics. e) Identify, select, and integrate video and digital images in varying formats for creating multi-media presentations, publications and/or	The proposed Standard of Learning focuses on student responsibility and opens up the use of technology to all currently available technologies, as well as those which may become available in the future.

PROPOSED C/T SOL	CURRENT C/T SOL	COMMENTS
	<p>other products.</p> <p>C/T12.3 The student will develop skills in the use of telecommunications networks.</p> <p>c) Access and use telecommunications tools and resources for information sharing, remote information access and retrieval, and multi-media/hypermedia publishing.</p> <p>C/T12.4 The student will demonstrate skill in the selection and use of appropriate technologies to gather, process, and analyze data and to report information related to an investigation.</p> <p>d) Select appropriate technology for communicating information for an intended purpose and audience.</p> <p>e) Utilize a variety of media and resources in collaboration with peers, experts, and others to design a learning activity and/or presentation.</p>	